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LOGO OF THE ASSOCIATION OF SYSTEMATIC BIOLOGISTS OF THE PHILIPPINES (ASBP)

W. Sm. Gruezo

(Editor's Note: The original of the logo was designed in watercolor by the author. It is reproduced here on the outer front cover of this publication.)

The logo is an abstraction of the acronym of the Association of Systematic Biologists of the Philippines — ASBP. The letters in the acronym are grouped as such so that the logo can be interpreted in as many ways as possible.

The lower green area is A, for Association, this and the upper green elliptic area constitute the S, for Systematic. The blue areas make up the B, for Biologists, and the gold areas are for P, Philippines.

The combinations of lines, strokes and curves signify a number of Philippine biota, thus:

- the top half of S = the leaflet of a moss, the primordial leaf of a flowering plant, or an algal cell;
- the whole B = an insect busy feeding upon a leaf, or half the face of a grasshopper showing the mouth and an ocellus;
- the top half of P = a fungal or bacterial spore, or a vegetative propagule or pollen grain of a flowering plant; and
- the lower half of P = the pincher of a crab, or the claw or beak of a bird.

The logo when viewed from different angles reflects the inherent diversity characterizing all biosystems, from a butterfly in flight to a swamp crab on the run or an insect feeding upon a plant. Above all, it radiates the dynamic interactions between and among the various components of Nature. The thin white lines symbolize Man as researcher, infinitely captivated by Nature, preoccupied with studying, analyzing, utilizing and interpreting its vast complexity.

Green symbolizes the freshness and originality of ideas; blue, for the nobility and loftiness of purpose; and gold, for the everlasting impact of the Association's contributions to Philippine biology.

SYSTEMATIC BOTANY IN THE PHILIPPINES: A PERSPECTIVE

Jose Vera Santos*

Systematic botany is the oldest branch of organized botanical science in the Philippines. It is recognized that research in many areas of botany is dependent on plant systematics, for one cannot ignore the importance of the correct scientific name of the plant one works with. Any local institution which is charged with the study of Philippine flora, in addition to rendering identification service to researchers and students in the natural sciences, should have a well-organized herbarium which is staffed with trained and experienced personnel and provided with the essential equipment, supplies and materials, an up-to-date library, and liberal funding for field collection trips.

Fresh plant collections are important in systematic work. Inasmuch as fertile specimens are not always available in the field at all times, the herbarium is one of the principal sources of fertile materials for serious floristic and monographic research on flowering plants. In this assemblage of preserved plants, each collection is generally provided with authenticated scientific identification, data on habitat, flowering season and other pertinent informations. Old collections are as useful as, or in some cases of greater importance than, recent ones. This can be gleaned from the inestimable value of the existing classical specimens studied by Carl von Linnaeus for his 1753 *Species Plantarum*. Certain controversial interpretations of the identity of Linnaean species are settled by referring to type specimens in the herbarium of the Linnaean Society of London. Likewise, when confusion arises in the identification of recent Philippine plant collections, after exhausting all available literature, one usually resorts to herbarium specimens for comparison and confirmation of identification of the plant in question. It will be noted that there are cases also when the newly described species were based not on fresh but on unnoticed herbarium specimens.

Our flora is being depleted due to anthropogenic factors among which are shifting (kaingin) cultivation, over-exploitation of our forests through uncontrolled or poorly regulated

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logging, expansion of development program for human settlement, and grazing. Fire and other natural factors like typhoon and lightning contribute to the destruction of habitats and attendant extinction of many species. Extant populations which were the sources of holotypes of species described as new from the Philippines are hardly available at present due to disturbance of type localities. The gradual disappearance of our rare, endemic and indigenous plant species is a sad state to reckon with. The herbarium as the repository of old and recent plant collections is the indispensable source of valuable information for vanishing species and our flora in general. This scientific heritage of our natural resource serves as the ultimate reference for the identification of many plant species especially those which are now extinct or are undergoing extinction.

During the time of E.D. Merrill, the standard procedure was to gather, whenever possible, up to 10 specimens for each collection number. The duplicates were distributed to principal herbaria in Southeast Asia, Europe and the United States of America. It may be assumed that this policy of liberal distribution of duplicates was based on the anticipation that what was destroyed in one herbarium would be represented by the duplicates preserved in other herbaria. With the complete destruction of the Philippine National Herbarium during World War II, the foresight of Merrill gained full justification. At present, voluminous duplicates of Philippine pre-war collection, including those of all forms of types, are to be found preserved in foreign herbaria. With the present situation, it is impossible thus to do serious monographic research on Philippine flora without examining the different type materials in foreign herbaria.

With this focus on the importance of the herbarium, the present deplorable condition of our herbaria deserves special concern. The Philippine National Herbarium (PNH) at the National Museum is supposed to set an example for well-developed and properly organized and maintained collections of preserved plants representing the Philippine flora. One has to make an ocular observation of the lamentable state of the plant collections in cabinets which are cramped in rooms and corridors with hardly any decent working space. Many specimens are at the mercy of the elements and destructive insects and molds. While the herbarium serves as the repository of precious botanical specimens which are preserved not only for posterity and utility, it should be realized that one of the principal functions of an her-

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barium is research, primarily in systematic botany. And yet one may witness at PNH the significant lack of technical personnel, the inadequate facilities, the very meager stock of literature and the very limited working space — all hardly conducive to a pleasant atmosphere for scientific investigation. This is not an indictment of the present state of PNH but a reminder to impress upon concerned citizens of our generation the dire need for support commensurate to the scientific value and national service of the herbarium to botanical advancement in the Philippines.

To appreciate better the present state of systematic botany in the Philippines, we may look back to its history. The significant activities in Philippine systematic botany started with the first edition of Fr. Manuel Blanco's *Flora de Filipinas* (1873) which was dominated by the Linnaean system of classification. The second edition came out in 1845, a few months after Blanco's death. The third edition (1877-1883) was authored by two Augustinian priests, Fr. Andres Naves and Fr. Celestino Fernandez-Villar; it has 4 volumes of text and 2 volumes of plates. The first 3 volumes are practically reprints of the first and second editions. The fourth volume, with 3 articles, has no direct bearing on the first and second editions. The first article by Fr. Antonio Llanos deals with certain plants not included in the first edition. The second by Fr. Ignacio Mercado treats Philippine medicinal plants, and the third by Fr. A. Naves and Fr. C. Fernandez-Villar contains a new appendix. The appendix is better known as *Novissima Appendix*, and it aims to reduce Blanco's species to those of earlier authors and to enumerate all plants then known in the Philippines.

It turned out that there were many errors in the identification of Philippine plants in Blanco's *Flora*. Merrill (1918), in his *Species Blancoanae*, made a critical revision of the Philippine plant species described by Blanco and Llanos. To be of greater value, Blanco's *Flora* should therefore be used together with Merrill's annotations and corrections.

From 1790 to 1875 various exploring expeditions from Europe and America visited the Philippines to collect botanical and other natural history materials. Only the more important ones are treated here.

The MALASPINA EXPEDITION, sent out by the Spanish government, was in the Philippines from March to December in 1792. Two energetic botanists, Thadaeus Haenke and Luis Nee,

made extensive collections of botanical specimens. A detailed account of the activities of the Malaspina Expedition and the fate of the Philippine botanical specimens collected by Haenke and Nee are given by D. Madulid in *Kalikasan* 12 (1-2) 1983 and *Acta Manilana*.

The WILKES U.S. EXPLORING EXPEDITION was in the Philippines in 1842. Botanical collections, mainly in Luzon, were made by Rich, Pickering and Brakenridge. These materials were studied by A. Gray and others and are now preserved in American and European herbaria.

The CHALLENGER EXPEDITION, the last of the great exploring expeditions to visit the Philippines, stayed for 4 months at various times in the years 1874 to 1875. While the localities explored covered wide areas from Manila to Zamboanga, with large volumes of natural history materials gathered, the botanical collections were few and unimportant.

One of the great collections of botanical materials in the Philippines was that of the English naturalist Hugh Cuming. He made his collections from 1836 to 1840, covering many provinces in Luzon, Visayas and Mindanao. His botanical collections amounted to 2,200 numbers. On his way to London, he collected also in Indonesia and vicinities. Unfortunately, his collections from the latter places were distributed with Philippine labels. For each collection number Cuming made many duplicate specimens which were distributed to different European herbaria. Until the close of the 19th century, the knowledge of Philippine plants by European botanists were based mainly on Cuming's collections.

Aside from Cuming, other collectors from England, Germany and the United States gathered botanical specimens in the Philippines.

The period from 1870 to the close of Spanish colonial administration in 1898 marked the revival of botanical activities in the Philippines. This was due mainly to the influence and botanical ability of Sebastial Vidal who was Inspector General of the Forestry Bureau in 1871, and Chief of the Commission of Philippine Forestry Flora in 1876. He published three volumes on Philippine plants covering (1) a synopsis of the families and genera of woody plants (1883), (2) a numerical index and systematic catalogue of phanerogamic plants collected by Hugh Cuming in the country (1886), and (3) a revision of vascular plants (1886).

listing have been added since by P. Cordero, Menez, Trono and H. Calumpong. Noteworthy in this connection is the significant increase in the number of local phycologists engaged in active, albeit not fulltime, taxonomical work, viz., J. Pantastico, M.R. Martinez, M.T. Zafaralla, E.G. Fortes, R. Modelo and A. Ponce-Hurtado, to name a few. This rare development is nowhere else evident in the other groups of microorganisms and most likely in the plant and animal groups as well. Indeed, even the microphytic algae are now beginning to gain some attention, for instance, from M. Fortes, P. Cordero and G. Trono. The soil inhabitants, however, remain ignored. Overall, despite the generally sketchy descriptions of mainly sterile specimens, a far broader picture of Philippine phycology is now in view.

C. FUNGI

A historical account of Philippine mycology up to 1935 is furnished by N.G. Teodoro in his *An Enumeration of Philippine Fungi* (1937). Up to that time and onwards till the mid-40's, Philippine fungi were studied almost exclusively by both resident and non-resident Europeans and Americans, the latter mostly with collections made during the great botanical expeditions that reached the archipelago. Except for J. Mendoza and S. Palo at the then Bureau of Science in Manila, no Filipino picked up the interest following the departure of the Americans. E.B. Copeland, the founder and first dean of the now UPLB was not only a pteridologist. He was also a mycologist, but with all his interest in mushrooms and that of O. Reinking in hyphomycetes, the exceedingly few Filipinos who developed a liking for fungal taxonomy did so with a decided predilection for species associated with plant diseases, the imperfect fungi in particular. Among the basidiomycetous fungi, mushrooms and polypores are the most attended to precisely because of their economic importance, respectively as potential alternate food and as incitants of decay of hardwood and softwood. The ascomycetes have been largely ignored except for the black mildews that are common under moist conditions on leaves and soft stems of angiosperms. In the 60's, the combined efforts of F. Uyenco, D. Reynolds and I. Dogma shed some light to the theretofore unexplored local acellular and cellular slime molds, net slime molds, Saprolegniaceae, coral fungi and gasteromycetes. An addendum to Teodoro's *Enumeration* has been published recently by T.H. Quimio and D.R. Capilit in 1981. For the mycomycetes, an expanded listing was done by D.R. Reynolds in 1981.

The decade just past witnessed the shift in emphasis to the mushrooms and phycomycetous or zoosporic fungi. T. H. Quimio has published a series of papers on the mushrooms of Mount Makiling, as well as an article on the genus *Pythium*. I. Dogma has given, and continues to give, detailed scrutiny to the zoosporic fungi, especially the chytridiomycetes. He has expanded the listing for Philippine phycomycetes from 43 species in Teodoro's *Enumeration* to nearly 300, and monographed for the world the genus *Bluytiomyces*. Under preparation are monographs for the genera *Monoblepharella* and *Apodachlya*.

Overall, fungal taxonomy in the Philippines is beset with several problems as discussed by I. Dogma in 1975. Perhaps the most important is the auspicious lack of serious workers. The current emphasis on mycorrhizal fungi and species involved in litter decomposition has so far contributed very little. However, it is speculated that it will eventually give birth to fungal soil ecology in the country. For example, V. Cuevas has shown that *Trichoderma aureoviridi* and *T. pseudokoningii* are fairly common and active cellulose decomposers. *Trichoderma viridi* of biotechnological fame has thus far not shown up.

D. LICHENS

The lichens of the Philippines have been treated extensively by E.A. Vainio in the early 1900. No other appreciable taxonomic work was done locally until 1979 when W. Sm. Gruezo published an extensive and up-to-date listing of all known Philippine species, and worked on the genus *Lobaria*.

II. BRYOPHYTES

The information on Philippine bryophytes, Hepatica (liverworts) and Musci (mosses), are widely scattered in foreign and local publications. The bibliography on Philippine Bryology, prepared by R. del Rosario and N.V. del Rosario (1967), serves as a convenient initial guide in tracing the literature.

A. HEPATICAE. The earliest reference to Philippine bryophytes is in *Synopsis Hepaticarum* by C.W. Gottsche, J.B.C. Lindenberg and C.G. Nees von Essenbeck (1844). This includes the first collections of Philippine hepatics by J. Meyen, H. Cuming and G. Caudichau-Beaupre. Subsequent local collections were mentioned in foreign authors' studies or monographic treatments of genera of Asiatic hepatics, such as the works of A.W. Evans

(1919), Fr. Verdoorn (1930) and G. Hoffman (1905). Among those who studied principally Philippine hepatics are Th. Horzog (1931) who published *Hepaticae Philippinensis*, and Fr. Stephani (1906) who described 9 new species of Philippine liverworts. The *Flora of Mt. Pulog* by E.D. Merrill and M.L. Merritt (1910) includes 23 species in 13 genera of hepatics. The more recent taxonomic treatment of Philippine hepatics is a series of 3 papers by R. del Rosario (1967-1975).

B. MUSCI

There were few Philippine mosses described before 1900. It was during the American regime beginning in 1902 that bryological investigations made rapid progress. E.D. Merrill exerted efforts to gather all available moss collections. These were studied and eventually published in a series of articles by F.F. Brotherus (1907-1926); many were described as new. In a list of Philippine mosses collected from different regions of the archipelago, R.S. Williams (1914) enumerated 240 species in 118 genera; 27 species and 3 genera were described as new. A comprehensive taxonomic treatment of the moss flora of the Philippines is E.B. Bartram's (1939) *Mosses of the Philippines* which includes 512 species in 180 genera and 45 families. On a much later date, the revised checklist of Philippine mosses by Z. Iwatsuki and B.C. Tan (1979) includes 625 species in 218 genera and 53 families. Regional moss floras of the Philippines include the works of R. del Rosario (1979-1981) on the National Botanic Garden, the Cordilleras, and Metro Manila. Other contributions to Philippine bryology are those of N.V. del Rosario (1959-1964) on 2 new species of mosses, and account of the taxonomy and ecology of Philippine mosses; F. Tixier (1978) on 187 species of mosses collected from Mountain Province; R. del Rosario (1979) and R.O. van Santen (1979) on 11 mosses new to the Philippines; R. del Rosario and G.L. Penicilla (1979) on 14 species of mosses from Lubang Island, Occidental Mindoro, and an account of 111 endemic species of Philippine mosses; Z. Iwatsuki (1980) on 20 new species of Philippine mosses; Iwatsuki and B. Tan (1979) on 2 new nomenclatural combinations; B. Tan (1981, 1982) on 2 fascicles of *Musci Philippinensis Exsiccati*, (1981) additions to the moss flora of the National Botanic Garden, and (1982) a checklist of Mt. Makiling mosses; Wm. Reese and B. Tan (1983) on a review of the Calymperaceae, including one new species from the Philippines.

With the revival of local interest in bryology, more contributions to the bryological flora of the Philippines may be

expected in the near future, for example, Z. Iwatsuki and B.C. Tan on 19 moss species new to the Philippines (1983).

III. PTERIDOPHYTES (Ferns and their Allies)

A. FERNS

The ferns received greater systematic treatment than their allies. Among the early works which made reference to Philippine ferns are those of H. Christ (1897-1910), C.R.W.K. van Alderwerelt van Rosenberg (1908, 1910), E. Rosenberg (1911) and C. Christensen (1906, 1913). L.M. Underwood (1903) was the first to give a summary of our knowledge of Philippine ferns. Sustained interest on the systematics of Philippine ferns began with the series of papers by E.B. Copeland (1905-1950) which includes a monograph of the family Polypodiaceae, several genera, and descriptions of many new species. These publications were based mainly on specimens from extensive collections throughout the archipelago. The pteridological career of Copeland in the Philippines culminated in the publication of his *Fern Flora of the Philippines*. This comes in 3 volumes (1958-1960) which are largely compilations of his previous researches on Philippine ferns. Copeland recognized 950 species in 155 genera.

M.G. Price (1972) made a critical review of Copeland's *Fern Flora of the Philippines*. He pointed out many oversights and errors, those which are typographical he attributed to Copeland's failing eyesight. A revised list of 920 species and 152 genera was presented, and the *Flora* was regarded as incomplete. Many ferns in Philippine mountains await discovery and several Philippine ferns still remain unnoticed in various foreign herbaria.

Despite the weakness of Copeland's *Flora*, it is still the most important literature for the general identification of Philippine ferns. However, for technical purposes, its use should be supplemented with the review by Price.

Further studies on the systematics of Philippine ferns gave way to the publication of additional contributions by the following investigators: P.M. Zamora (1971, 1972, 1973, 1974, 1975), P.M. Zamora & M.G. Price (1969), P.M. Zamora & N.S. Vargas (1973, 1975, 1976), P.M. Zamora & L.L. Co (1976, 1977, 1980), and S. Chandra & P.M. Zamora (1981).

B. FERN ALLIES

The allies of ferns were given comparatively less attention.

Published reports include those of Copeland (1907), G. Hieronymus (1913), A.H.G. Alston (1935), P.M. Zamora (1959) and B. Tan (1975) on *Selaginella*, W. Herter (1923) and P.M. Zamora (1971) on Lycopodiaceae, P.M. Zamora (1970) on Equisetaceae, P.M. Zamora & C.V. Zamora (1970) on Psilotaceae and Isoetaceae, P.M. Zamora & N.S. Vargas (1971) on Ophioglossaceae.

IV. GYMNOSPERMS

The first general treatment of Philippine gymnosperms was presented by F.W. Foxworthy in 1911. This was followed in 1922 by Merrill's enumeration of all species in the Philippines. A later report in 1978 by D. de Laudenfels on the *Taxonomy of Philippine Coniferae and Taxaceae* includes the description of 23 known conifers and one taxad.

V. ANGIOSPERMS

The sustained interest of E.D. Merrill in flowering plants and his great efforts in supporting botanical researches may have influenced the placing of greater emphasis on systematic investigations of Philippine angiosperms. To insure a more established foundation for floristic studies, he made detailed annotations and corrections of the identifications of plant species by Blanco and Llanos in *Flora de Filipinas*. Merrill published regional floras for Lamao Reserve Forest (1906), Mt. Halcon (1907), Mt. Pulog (with Merritt) (1910), Manila (1912), and Banguay Island (1926). He prepared several monographs, among which are those on the families Ericaceae, Cannaraceae and Loranthaceae, and the genera *Freycinetia*, *Garcinia* (1905) and *Cycas* (1936). In addition, he described hundreds of new species.

Among Merrill's contemporaries who prepared monographs on Philippine flowering plants were A.D.E. Elmer (1906) who worked out the Rubiaceae and Compositae in addition to several genera. Like Merrill, Elmer described hundreds of new species. C.B. Robinson worked on Boraginaceae (1908), Chloranthaceae and Phyllanthaceae (1909), and Urticaceae (1911).

Merrill sent out specimens to foreign specialists either for identification and description or for monographic studies. Thus, O. Beccari (1919) received palms, J.S. Gamble (1915) bamboos, and E. Hackel (1905, 1907, 1908) herbaceous grasses.

The results of explorations and taxonomic researches were published in government bulletins and scientific journals, and in

A.D.E. Elmer's private publication *Leaflets of Philippine Botany* which run to 10 volumes from 1906 to 1939. Some foreign taxonomists who worked elsewhere on Philippine plants published their papers in local and foreign scientific journals.

The advances in systematic botany in the Philippines since 1902 were remarkable. All available publications and voluminous collections examined by Merrill formed the basis of his *Enumeration of Philippine Flowering Plants* (1922-1926), the general foundation for the preparation of the vascular flora of the Philippines.

Foreign botanists dominated Philippine plant systematics during the greater part of the American regime. However, the later part of this administration marked the gradual transition of responsibilities of local botanical research from the transients to Filipino residents. University students with aptitude in systematic botany were given the opportunity to undergo basic training and many were later sent to American and European universities for advanced studies in preparation for their greater participation in research work on Philippine flora. At present, local floristic projects are largely in the hands of Filipinos as can be gleaned from the following developments in the systematic study of Philippine flora after the publication of Merrill's *Enumeration*, 2 years after he left the Philippines.

ENUMERATION IN SPECIAL GROUPS: N. Teodoro (1937), fungi; I. Dogma (1975), lower fungi; T. Quimio and D. Capilit (1981), fungi; D. Reynolds (1981), myxomycetes; G.T. Velasquez, G. Trono and M. Doty (1977), algae; M. Martinez (1984), blue-green algae; Z. Iwatsuki and B. Tan (1979), mosses; W. Gruezo (1979), lichens; F. Salvosa (1963), trees; J. Rojo (1979), dipterocarps; D.R. Mendoza and R.M. del Rosario (1967), Philippine aquatic flowering plants & ferns.

REGIONAL FLORAS: J. Pantastico (1977), fresh water algae of Laguna de Bay and vicinity; S. Saraya and G. Trono (1979), marine benthic algae of Santiago Island; Trono & E. Gonzon-Fortes (1980, seaweed flora of Calatagan; J.V. Pancho (1972), aquatic angiosperms of Laguna de Bay, (1983) weeds of tobacco farm (with S. Obien), (1983) plants poisonous to livestock in the Philippines, and (1983) vascular flora of Mt. Makiling and vicinity, part 1.

MONOGRAPHS OF PHILIPPINE PLANTS: I. Dogma (1977-), continuing series on zoosporic fungi; G.T. Velasquez (1963), blue-green algae; P. Cordero (1980), useful algae; J. Men-

doza (1938), mushrooms; T. Quimio (1978), edible mushrooms; W. Gruezo (1983), lichens; E.B. Bartram (1939), mosses; R. del Rosario (1973), *Sphagnum*; E.B. Copeland (1958-1960), ferns; D.J. Laubenfels (1976), conifers and Taxaceae; E. Quisumbing (1930), Piperaceae, (1931) medicinal plants; J.V. Santos (1950), *Garnotia*; D.R. Mendoza (1964), *Xylosema*; H. Valmayor (1983), Orchidaceae; H. Gutierrez (1983), Dipterocarpaceae; J.V. Pancho (1976), aquatic weeds; and E. Menez, R.C. Philipps and H. Calumpo (1983), seagrasses.

To keep abreast with recent developments in plant systematics, the approaches have gradually expanded from the traditional comparative gross morphology. Progressive systematists are beginning to utilize the findings and techniques in other areas in botany — anatomy, palynology, embryology, cytology, genetics, phytogeography, ecology — and chemistry and mathematics in an attempt to understand better plant relationships. For zoospore fungi, I. Dogma (1977-) combines morphology with development and culture, and Gruezo (1978) uses histochemistry for lichens. Along anatomy, we have the works of G.T. Velasquez (1931) on bamboos, S. Chandra (1979) on drynarioid ferns, V. Amoroso (1983) on Philippine ferns, R. Mendoza (1980) on *Selaginella*, and D. Madulid (1980) on *Plectocomia*. Palynological techniques were used by F.C. Garcia (1937) on plants with anemophilous pollen grains, by S. Chandra & P.M. Zamora (1981) on drynarioid ferns, and by D. Madulid (1980) on *Plectocomia*. Comparative biochemistry of plant products was used by M. Oliveros and M. Cantoria (1982) on *Zingiber zerumbet* (L.) Sm. and its proposed variety, and by D. Madulid (1980) on *Plectocomia*. In the cytotaxonomic studies of rice at the IRRI, variation in chromosome number was used in the separation of species. Numerical analysis was applied by D. Madulid (1983) to the *Calamus javensis* complex.

Comparative gross morphology will continue for a long time as the main approach in Philippine plant systematics. New evidences based on other areas of botany and on chemistry and mathematics are beginning to yield significant findings on the relationships of different taxa.

Systematic botany in the Philippines is confronted with problems some of which have been brought out above. In addition there is a great need for more competent personnel to undertake active participation in the systematic pursuit of our flora. The

few technical personnel who are devoted to full-time research in plant systematics are in the Philippine National Herbarium of the National Museum. The rest, with similar training and experience, are in private and government colleges and universities and other institutions, and are usually preoccupied with either teaching or administrative activities which leave them little time for research in systematics.

When we compare the Philippines with our surrounding countries like Japan, Taiwan, India, Sri Lanka, China, Malaysia, Indonesia and Australia, we have to admit, with misgivings, that we lag behind in national floristic research. The preparation of *A Flora of the Philippines* needs a coordinated and centralized program of national scope. The *Guide to Philippine Flora and Fauna*, sponsored by the Ministry of Natural Resources in cooperation with the U.P. Natural Science Research Center in a modest beginning. Our available systematists participated with full interest and vigor, and voluminous output was realized. Unfortunately, the results remain to be published. With the magnitude of a long-range undertaking of Philippine flora, the government is the appropriate agency to assume full encouragement and financial support. Our systematists are enthusiastic to participate to the best of their expertise. All they need are liberal freedom to concentrate in their work, decent facilities, minimum bureaucracy and reasonable financial support. This challenge to Filipino systematists will involve a heavy financial investment from the government but the results of the investigation of our flora will be the basis in assessing the economic potentials of the different plant species, and will contribute immensely to the meaningful advancement of botanical science in the Philippines.

PIONEERS IN PHILIPPINE PLANT SYSTEMATICS

This report will not be complete without giving appropriate tribute to the following selected pioneers who blazed the trail in Philippine systematic botany.

(1) Fr. MANUEL BLANCO (1778-1845) was a Roman catholic missionary of the Augustinian order. As a Spanish priest assigned to the Philippines, his principal mission was the propagation of Christian faith. However, as a scholar in the field of botanical science, he devoted the greater portion of his available time to the study of plants and distinguished himself as a systematist. His

research activities on local flora culminated in the publication of the first edition of his *Flora de Filipinas* in 1837. The later two editions were published after his death, by and in collaboration with his successors. This documentary botanical literature, despite the many errors in plant identifications which were pointed out by E.D. Merrill (1918), served as the fundamental background for later investigations of Philippine flora.

(2) ELMER D. MERRILL (1876-1956) came to the Philippines in 1902 as botanist of the Bureau of Agriculture and Forestry. Later he was transferred to other government offices which paved the way to his botanical pursuit. Before he left the Philippines in 1924, he accomplished magnificent contributions to the knowledge of Philippine flora. Of the more than 300 new species of vascular plants he described and more than 500 technical papers and books he wrote during his lifetime, many were on or with reference to Philippine flora. His monographs on numerous genera of Philippine plants and several publications on regional floras of the Philippines have greatly enriched our knowledge of the identities of our plants. His monumental work *An Enumeration of Philippine Flowering Plants* (vols. I-IV, 1922-1926) is the guiding foundation for succeeding investigations on the systematics of the vascular flora of the Philippines. During the tour of duty of Merrill in the Philippines, explorations for and collections of plants and publications on Philippine flora were at their peak. He organized voluminous collections of herbarium specimens, mainly of Philippine and Southeast Asian origin, the size of which has not been equalled to the present. Realizing the importance of adequate literature in research, he established the then Science Library which was the pride in Southeast Asia during his time.

(3) EDWIN B. COPELAND (1873-1964) started as a plant physiologist before he came to the Philippines in 1904 to become the systematic botanist of the Government Laboratories, later the Bureau of Science. He worked on the taxonomy of fungi (mushrooms) and, later, of ferns. Eventually he established the U.P. College of Agriculture of which he was the first dean. He held other high positions in the Philippine National Government. Between the different appointments he moved back and forth the Philippines and the United States. But all those years of changes in positions, he was active in the systematics of Philippine ferns. His latest data on Philippine ferns include 943 species, of which 449 "seem to be endemic". His principal contribution to the knowledge on the taxonomy of Philippine plants is the document-

ary monograph entitled *Fern Flora of the Philippines*. This work of Copeland stimulated great local interest to continue further taxonomic investigations of Philippine ferns, extending the scope of the study to the potential values of the different species.

(4) EDUARDO QUISUMBING (1895-). The transition in sharing the responsibilities on systematic botany in the Philippines, from the Spanish friars to American colonizers and finally to the Filipinos, was a gradual process. When E.D. Merrill left the Philippines in 1924 for a new position in the United States, he left the great undertaking of leading the continuation of systematic botany of our country to his ardent and illustrious Filipino student, Eduardo Quisumbing. Even before Merrill's departure, Quisumbing co-authored with the former a series on new and noteworthy species of Philippine plants. It may be surmised that Quisumbing acquired the refined technique in systematic botany during his close association with Merrill. Of the 137 scientific papers attributed to him, most refer to Philippine flora; the greater number are to his own credit and the rest he co-authored with Merrill, O. Ames and some Filipino botanists.

As a plant systematist, the primary interest of Quisumbing was in Philippine orchids on which he published monographs of several genera. He also co-authored with O. Ames a series of about 6 articles on new and noteworthy Philippine orchids. However, he often branched out to other groups of vascular plants. Among his major contributions to Philippine flora are the *Monograph of Philippine Piperaceae* (1930) and the *Medicinal Plants of the Philippines* (1951).

During World War II, the Philippine National Herbarium, with 305,367 specimens, went completely to ashes. After the war, it was the crucial task of Quisumbing, as Director of the National Museum, to rehabilitate this institution, including the herbarium. He organized extensive plant explorations and collections in different parts of the country during all seasons of the year. Upon his retirement in 1961, he must have had the satisfaction of having restored the functional value of the Philippine National Herbarium with its 76,983 preserved specimens.

(5) EWIN B. BARTRAM (1878-1964). The early part of Bartram's botanical career was devoted to the publication of scientific papers mainly on flowering plants, which he discontinued in 1922 to concentrate his researches and bryophytes. He contributed from 1909 to 1966, 148 technical papers on mosses including the description of several hundred new species. The geographical

areas of moss localities which he studied include the different states and countries from the Antarctic to Argentina of the American continent; the mainland of Asia including Burma, India and China; the islands of the Pacific Ocean mainly Hawaii, then New Zealand, Australia, Borneo, New Guinea, and the Philippines.

Merrill was instrumental in the preparation of Bartram's monograph of Philippine mosses. An arrangement was made for the loan of the entire moss collections of the Philippine National Herbarium, the U.P. College of Agriculture and other moss materials from Negros Province. In 1935 H.H. Bartlett of the University of Michigan was an exchange professor for one year in the Botany Department, University of the Philippines in Manila. His extensive moss collections throughout the archipelago were supplemented by the mosses collected by the personnel of the Botany Department. All these specimens added considerably to the materials available to Bartram in the preparation of his monograph of *Mosses of the Philippines* (1939) which serves as the basis for greater knowledge on Philippine mosses. This impressive work is by no means complete as evidenced by the publications, on later dates by Bartram and other authors, of many new records and new species of Philippine mosses. Bartram's monograph triggered greater interest in Philippine bryophytes. At least two local botanists, R. del Rosario and B. Tan diverted their research efforts to continue the systematic studies of Philippine mosses.

(6) EDWARD AUGUST VAINIO (1853-1929)

One of the distinguished European lichenologists with international prominence was E. A. Vainio of Finland. His scientific publications amount to more than 100 technical papers on the taxonomy of lichens, including the description of an estimated 1700 new species. Among his outstanding contributions to lichenological research was on the natural classification and morphology of the lichens of Brazil (1890). This 526-page comprehensive report on the results of his lichenological travels, collections and studies in that country gained him the reputation of a "very prominent expert on tropical lichens".

E. D. Merrill, as Director of the Bureau of Science which used to house the herbarium, was greatly concerned with the large collection of Philippine lichens which needed proper identification. In this desire to share with Vainio's expertise on tropical lichens, Merrill sent him the duplicates of Philippine lichens which were gathered throughout the archipelago by numerous collect-

ors. The results of Vainio's critical investigation of these lichen materials resulted in the publication in 4 parts of the first and only floristic treatment of Philippine lichens, where he described some 512 taxa new to science: 6 genera, 403 species, 1 subspecies, 87 varieties, 14 formae and 1 subforma (Gruezo 1979). With the total destruction of the pre-war collections of the Philippine National Herbarium during World War II, the Vainio Herbarium at the Institute of Biology, University of Turku, Finland, is the only principal source of authentic lichen materials including all forms of types for valuable reference in any serious systematic investigation of Philippine lichens.

If these pioneers of Philippine systematic botany were present today to assess the significant increase in the continuing contributions of resident Filipinos to the advancement of Philippine plant systematics, I am sure they would feel great exultation to witness that their pioneering efforts were not undertaken in vain.

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Pioneers in Philippine Plant Systematics. For details, see text.



MOSES OF THE PHILIPPINES
JOSUE ARRIAGA, JOURNALIST

Segun el Sistema sexual
de LINNEO
POR EL P.
FR. MANUEL BLANCO



PHILIPPINE FIFERACEAE
EDUARDO A. QUESADA

AN ENUMERATION
OF PHILIPPINE
FLOWERING PLANTS
Eduardo D. Merrill



FIGUINAS
FRANCISCO J. FIGUINAS

FERN FLORA OF
THE PHILIPPINES
EDWIN B. CORLESON



This was the monument put up at the then Mehan Garden in Manila by the defunct Philippine Society for Plant Taxonomy. The inscription on the marker was as follows: "SEBASTIAN VIDAL Y. SOLER 1842-1889 A NATIVE OF BARCELONA, SPAIN, INSPECTOR GENERAL OF PHILIPPINE FORESTRY BUREAU, 1871. COMMISSIONER FOR THE FOREST FLORA OF THE PHILIPPINES, 1876. ESTABLISHED A LOCAL BOTANICAL LIBRARY AND HERBARIUM. PUBLISHED IMPORTANT TREATISES ON PHILIPPINE FLORA. Philippine Society for Plant Taxonomy August 12, 1961."

PHILIPPINE SYSTEMATIC ZOOLOGY: ITS PAST, PRESENT AND FUTURE

Carmen C. Velasquez*

I welcome this opportunity to talk to you on a subject which I believe has relevance, as the various branches of science and in particular those of biology become isolated from one another and integrated knowledge becomes increasingly difficult. It can be said that specialization is an inevitable outcome of progress in any science. Hence, this discussion brings forth some type of understanding in this state-of-affairs in the country.

To attempt to cover in this brief lecture the centuries of human effort to cope with the multiplicity of knowing the animals in this country is, I believe, quite a task and perhaps even presumptuous. At most, I shall try to sketch only the development of some of the outstanding efforts of some of the earlier naturalists and zoological systematists.

Systematics pertains to the system of classification of organisms and was at one time regarded as distinct from the theoretical science of taxonomy, but the two terms are also used interchangeably to include both the theoretical and practical aspects of the subject.

From the earlier times, man has sought knowledge of animals and plants. However, the written records of his biological knowledge are sparse before the works of natural philosophers. The accumulated knowledge remained largely unsystematized until organized by Aristotle (384-322 B.C.) and Theophrastus (370-285 B.C.), the fathers of zoology and botany, respectively. Taxonomic progress lagged behind for some time due to lack of a suitable system. John Ray (1628-1705) and Carolus Linnaeus (1707-1778), building on the works of their predecessors and crystallizing the emerging philosophical techniques of presentation, published on their great works. The classic *Systema Naturae* by Linnaeus was one of those that laid the foundation of modern biological taxonomy. The binomial system of nomenclature was used to allow scientific designation, and a hierarchy of taxonomic categories was utilized for the groupings according to degrees of similarities and differences. The local faunas and floras were described and classified by this method. This system became

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known as the natural system of classification and it dominated taxonomic philosophy for a century.

Man started reconnoitering the world. The Spanish and the Portuguese empires grew rapidly and the increase in travel and trade together with nature research resulted in an explosion of knowledge of forms of both plants and animals. The publication of Darwin's *The Origin of the Species by Natural Selection* in 1859 was the outcome of the voyage of the *Beagle*. It opened new philosophical outlook in biology and much speculation on phylogeny, i.e., evolutionary biology. The bulk of new information required biologists to set up a system of information storage and retrieval that was more efficient than just an arrangement or enumeration of such acquisitions.

When considering the historical development of systematics in this country, we should realize that certain contingent activities during the Spanish regime (1521-1898), the American regime (1898-1941; 1946-1948) and the ad interim Japanese Occupation (1944-1946) have influenced, if not governed, systematics in this country.

The first recorded attempts of those scientifically inclined to study the local fauna were around the middle of the nineteenth century. Some of the early European explorers collected in Manila and great expeditions sponsored by the French, English and Germans were sent to the Philippines as early as 1836. Accounts were published by eminent personalities of the time, for example, Baron Cuvier of France, Hugh Cuming of England and F. Jagor of Germany, also Wilhelm Peters of Berlin and A.B. Meyer of Dresden, to mention a few.

In the meantime, Dominican friars interested in natural history had started a museum in the University of Santo Tomas and by the first third of the 19th century, they had accumulated considerable collection of fishes and other animals. After 1865, Jesuit priests started a museum at their school, the Ateneo de Manila. However, very little was added after 1885 or 1890. The collection of the H.M.S. Challenger Expedition (1873-1876) provided materials for study at the time.

In 1895, Casto de Elera began the publication in Manila of the *Catalogo Sistemático de Toda la Fauna de Filipinas*. Some other workers also started to compile and make lists from various authors, at times without acknowledging the preceding works.

Worthy of note are the efforts of our national hero, Dr. Jose Rizal, who, as a naturalist, collected all sorts of animals which he sent to specialists in Germany for identification. His shell collection, properly identified, are quite commendable. His drawings of fishes from Dapitan during his exile are quite precise as to warrant their use in identification.

The American regime was characterized by intensive collection of floral and faunal materials. The Siboga Expedition's (1904) and the U.S. Fisheries Steamer Albatross Philippine Expedition's (1907-1910) enormous collections provided materials for biological study. Checklists of real scientific value were prepared. In the field of ichthyology alone, to mention one, such names as David Starr Jordan, R.E. Richardson, Alvin Seale, Richard Crittender McGregor, Albert W. Herre, Barton Warren Evermann, Gunther, Muller, Peters Boulenger, Bleeker, Cuvier & Valenciennes, Kner & Vaillant stood out. McGregor published his *Manual of Philippine Birds* in 1909-1911.

For invertebrates we had such names as Semper & Clark, Dickerson (1928). In collaboration with Elmer D. Merrill, Richard C. McGregor, W. Schultze, Edward H. Taylor and Albert W.C.T. Herre published the book *The Distribution of Life in the Philippines*. The foreign parasitologists too were busy in their own way describing and identifying new forms of medical importance. P.M. Ashburn, C.E. Craig, W.H. Boyston, I.W. Brewer, W.P. Chamberlain, C.L. Cole, P.E. Garrison, M.C. Hall, B. Schwartz made notable contributions.

The Department of Zoology, University of the Philippines, profited from the earlier works of Day, Light, and Sivickis.

The publications of Taylor (1921, 1922, 1934), Hachisuka (1931-1935), Roxas & Martin (1937), Villadolid, Rabor, Rabanal, Umali, Ronquillo, and Manuel, to mention a few, augmented our knowledge on Philippine vertebrates. For the invertebrates we have such names as Uichanco, Roxas, Domantay, Faustino, and Tubangui.

With World War II and the Japanese Occupation, the lost materials could not be estimated by their weight in gold. Much had to be done and much more remains. The Philippine National Museum as it stands today is a witness to such retrieval activities, and so are the other interested institutions and researchers.

The more recent Danish Galathea Expedition (1952) and the Museum de Histoire Naturelle Expedition of France (1976, 1980) have increased our information on relatively less-explored areas like the Mindanao Trench and those of Lubang in Mindoro. Added to these are the activities of contemporary foreign zoologists, not to mention the contributions of our young zoologists today, of which this audience is well informed.

The emergence and growth of the science of genetics in the 20th century provided a better understanding of individual variation, and taxonomists have focused their attention on the species and their subdivisions as natural populations. The biological concept, with its emphasis on geographical distribution, ecological requirements, genetic mechanisms and degrees of reproductive isolation, has thus far proved applicable only in sexually reproducing organisms but it has been a useful concept in spite of its practical limitations.

PRESENT TAXONOMIC ACTIVITIES

Assembling of taxonomic materials involving the sampling of populations, preservation of the samples for subsequent study — procedures varying from group to group. These collections are essential sources of material for comparative morphological purposes for some kinds of ecological data (i.e., seasonal and geographical distribution). These are maintained in national museums of the world or are with the individual collectors (amateur or otherwise). However, in experimental taxonomy in all fields, as in life history studies, living materials for comparative study are maintained.

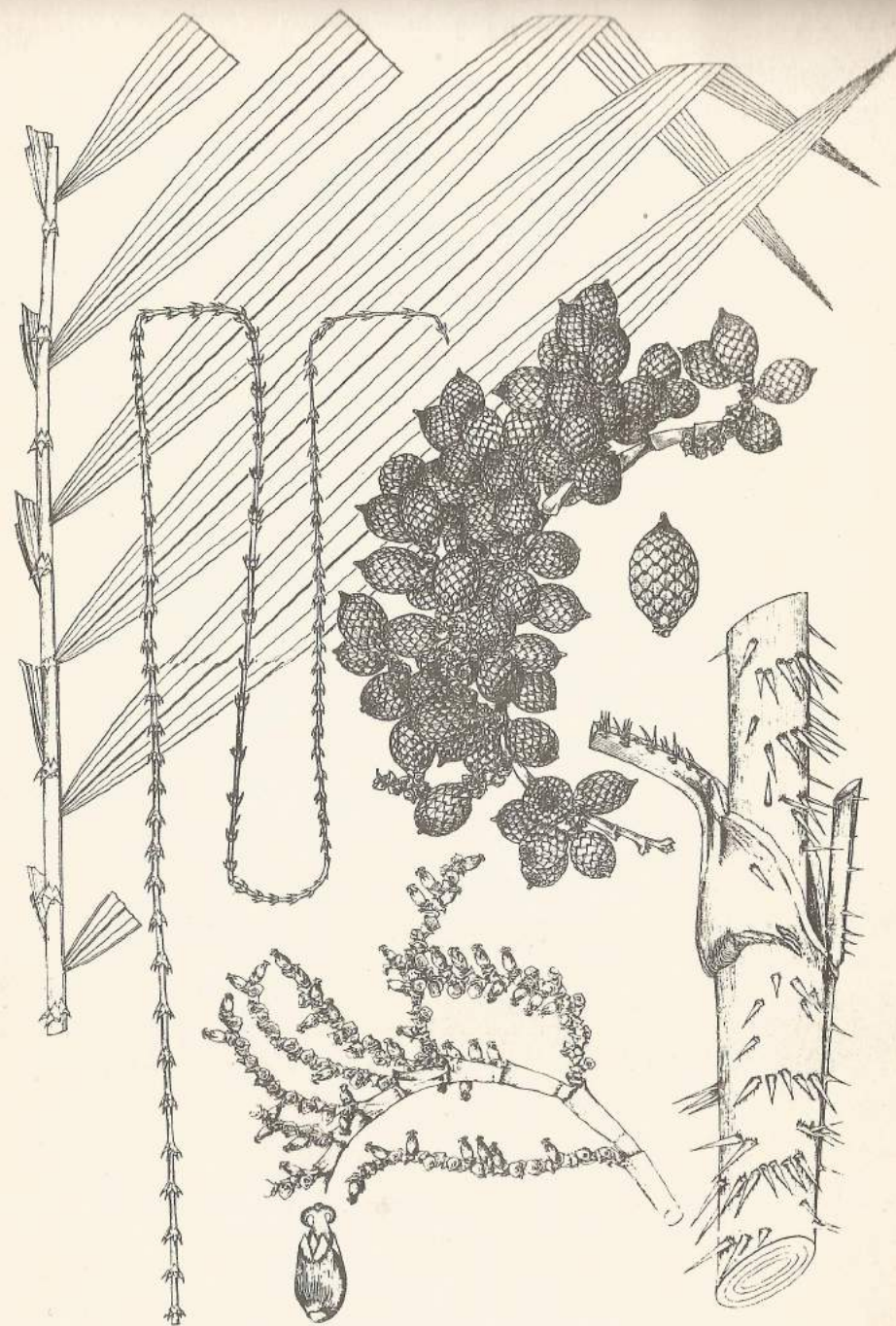
Another activity involves the *discrimination among assembled taxonomic materials*. The main objective is the recognition of natural populations of organisms (species). This is done by comparing population samples by means of taxonomic characters. If the samples are of dead materials or dry populations made from freshly killed organisms, the taxonomic characters available are largely morphological whether at the level of the cell (cytological or karyological) or in terms of gross external anatomy. Living organisms may be compared on the basis of physiological characters (serological reactions, metabolic factors, body secretions, genetic make-up, means of reproduction, biochemical properties). Field studies provide a source of ecological characters (habitat requirements, geographical distribution, limiting factors) and

behavioral characters (orientation, movements). The number of taxonomic characters available from these and other sources may be very large, and species in the same genus may differ by several hundred characters, although most of these are difficult to demonstrate and the exact total in a given instance will probably be never determined.

The third activity involves the *maintenance and improvement of the generally accepted nomenclature* for designating taxa. The *International Code of Zoological Nomenclature*, for which I had the opportunity to participate in a Colloquium in Zoological Nomenclature held in 1958 in London, England in connection with the XVth International Congress of Zoology, has been developed to govern the application of scientific names in zoology. These rules are in constant study and are subject to modification and change by international congresses of the science concerned.

A fourth activity involves the *grouping of species into larger taxa* with generalizations that can be made so as to permit the organization and codification of biological knowledge. For purposes of generalization, the usefulness of the recognized taxa depends to a great extent upon the degree of similarity expressed by the species which comprise them. Degree of similarity is usually determined by the number of taxonomic characters which the species have in common. For this purpose, characters may be drawn from among those utilized for taxonomic discrimination (e.g., comparative morphology, comparative physiology, comparative ecology). In order to express readily the different degrees of similarity existing among species, a hierarchy of taxonomic categories is utilized in which lower taxa are grouped in an ascending series of larger taxa at successively higher levels until all are embraced in a single comprehensive taxon. The resulting arrangement comprises a classification of organisms (Phylum, Class, Order.)

The fifth activity is the *constant scrutiny of classification* and its reconstruction, alteration, modification, where necessary, in order to express better presumed phylogenetic relationships and to eliminate polyphyletic taxa, for example, the Heterophyidae and Microphallidae. This may be done by the aid of data from the geographical or ecological distribution of the elements which make up the taxa, or by various statistical techniques such as the weighing of characters, especially those which tend to vary concurrently, or by utilizing a sufficiently large number of characters to minimize subjectivity.



Calamus ornatus var. *philippinensis*. Limoran, rattan.



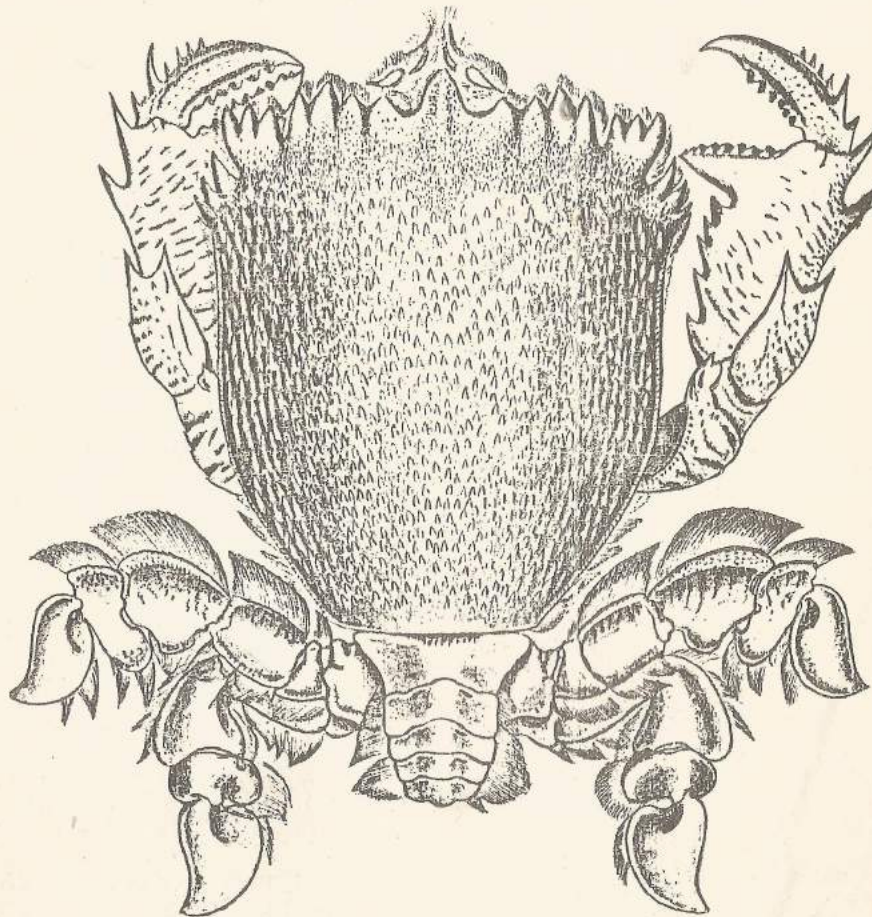
The Association of Systematic Biologists of the Philippines (ASBP). Highlights of the General Meeting, Induction of Officers & Members, and Symposium on Philippine Systematic Biology: Its Past, Present and Future. Master's Hall, National Museum, Manila, 17 September 1983.

In actual practice, these activities usually progress together and are not necessarily separated by the practicing taxonomists.

TAXONOMIC METHODS

Descriptive method. This was established by Linnaeus as part of his nomenclatural system (binomial) and was designed to provide a point of reference for zoological or botanical names. The taxonomic description is still an essential part of the nomenclatural system, and a description must accompany the proposal of names of previously unrecognized taxa. However, the original description accompanying the proposal of a new scientific name, especially at the species level, is rarely sufficiently detailed to permit its use as a standard for comparison. As a result, species and other taxa must be redescribed to take into account increasing knowledge. The redescription thus becomes an important method of communication among taxonomists. Its preparation requires a thorough knowledge of the group of organisms involved as well as familiarity with, and ability to effectively utilize, descriptive terminology.

Type method. The shortcomings of the descriptive method are partially offset by the type method, a taxonomic and nomenclatural device for providing a fixed reference point for the application of scientific names to taxa. As biological nomenclature has expanded since its establishment by Linnaeus, there is an urgent need for fixed points of reference. The first application of the type concept involves the names of species, the point of reference (type) being the material which the author had before him when he described a new species, and often also such material as he subsequently added. However, greater precision has become essential, and as type specimens have been more rigidly defined, in some cases more than 100 kinds have been differentiated. These types are in three classes: (a) *primary types* (including holotypes, allotypes, paratypes, syntypes and lectotypes), the original specimens used by an author in describing or illustrating a new species; (b) *supplemental types* (including neotypes and plesiotypes), the specimens serving as a basis for descriptions or illustrations which supplement or correct knowledge of a previously described species; and (c) *typical specimens* (including topotypes, metatypes and homotypes), specimens of varying degrees of authenticity which have not been used in connection with published descriptions or illustrations.



Ranina ranina (female). *Kuracha*, edible frog crab.

As classifications were revised and the number of named taxa increased, points of reference for names of collective (group) categories became increasingly necessary. This was particularly true of generic names, since these often provide the roots for the names of higher taxa. As a result, the type concept was extended to collective categories, the type of a genus being a species, the type of a higher category being a genus. With this development, precise rules have been developed in the nomenclatural codes governing type designation and type selection.

PUBLICATION FORMS

Taxonomic information is presented in the form of isolated descriptions, revisions of existing classifications, or comprehensive monographs. Catalogues provide list of species, usually with citations of literature and synonyms. Field handbooks are prepared for purposes of identification, and faunal works cover in a technical way the animals of particular regions.

Taxonomic publications consist of descriptions, diagnoses, keys, synonyms, and diagrammatic representations of the relationships of taxa.

SPECIAL PROBLEMS

The species and its subdivisions. The species, although elemental and basic in classification, remains a subject of controversy. To some, it is a building block for classification, analogous to the cell in an organism or to an atom in a physical system, representing a significant level of integration in our universe. To others, the species is an arbitrary stage of evolution, a fixed point to attach a name to, or a convenient pigeonhole for filing information. As understood by Ray and Linnaeus, species were distinct entities in the local flora and fauna of England and Sweden. Members of a species showed individual variation, males differed from females, and some showed seasonal changes, but hybrids were unknown or rare. This resulted in a static species concept and was in keeping with the then prevailing idea of "special creation".

Early in the 20th century, genetics provided a new concept of species based on the idea of genetic compatibility within the species and reproductive isolation between different species. Species then were all individuals that could potentially or actually share the same gene pool, the populations varying in space and time but always in dynamic equilibrium with their environment.

Plant species consist of numerous local forms or ecotypes which differ morphologically and usually also genetically from adjacent types. These forms arise through the influence of local climatic or soil conditions. In animals, local populations are likewise different and these rather spatially isolated geographical races are commonly named as subspecies. The degree of difference that is commonly recognized as nameable is a debatable point but the seventy-five-per cent rule is one attempt to an arbitrary criterion. If 75% of the individuals within a given population are different from the existing species, the subspecies may be named. Species that break into recognizable subspecies are called "polypotypic species". Subspecies are allopatric, living in adjacent areas and showing more or less complete geographical replacement. Hybridization is common at the zones of contact and in plants may result in polyploidy or duplication of number of chromosomes. Intermediate zones may be just a few feet or may extend for many miles. Some characters within large populations may change gradually from one extreme to another (color, body weight) over thousands of miles. These character gradients are called clines (Huxley) and are not to be confused with taxonomic categories. Species names are binomial, consisting of a generic designation (*Schistosoma*) and a specific epithet (*japonicum*). Subspecies are trimonial (*Paragonimus westermani philippinus*).

A different species concept is necessary for asexual and parthenogenetic forms. The strains of bacteria and viruses and the clones in plants are reproductively isolated. There is no fusion of gametes and no mixing of genetic factors. The taxonomic treatment of asexual types varies but forms that differ in constant morphological characters or in their reaction to various culture media are generally named. Others that differ in degree of virulence as determined by the reactions of the host are referred to as *types* or *strains*.

Individual variation is characteristic of organisms and is conspicuous in bisexual animals. In its simplest form, variation reflects the mutation in genes and such variants segregate according to the Mendelian laws of heredity. However, in the museum, extreme variants are not easy to distinguish from species.

STATUS OF TAXONOMY

Taxonomy dominated the field in biological sciences up to a century ago. This was a period of great explorations and the dis-

covery of exciting new plants and animals. Then, with the rise of physiology, genetics and other experimental sciences, taxonomy was looked upon more as a source of scientific names than as a science in its own right. Gradually, because of the economic importance of plants and animals and the necessity for accurate identifications, this situation has changed.

Unfortunately, there are relatively few positions in the world devoted to pure taxonomy. There is a need for most efficient use of its limited manpower for the accomplishment of its enormous task. At present, the coverage of groups of plants and animals by specialists is very uneven. There are about 7,000 taxonomists working on over a million species of animals. In zoology, 75% of taxonomists specialize on invertebrates and 25% on vertebrates. Twenty per cent are paleontologists and 1/3 are entomologists (Blackwelder). In the Philippines, we are a handful, needless to mention them, since most are known to you; some are members of this Association.

In the United States, the National Science Foundation has administered a far-sighted and broadly based program for the support of sound taxonomic work. This has resulted in more and better taxonomic studies and increased recognition of taxonomy by its sister disciplines.

CHALLENGE OF TAXONOMIC RESEARCH

At the present time, it can be said that the broad contributions of biological classification in developed countries have been worked out. In most groups, the pioneer stage is over and taxonomists are no longer preoccupied with mere naming of new forms, though much of this remains to be done, particularly in this country.

Experimental taxonomy has already advanced (especially in entomology) and is contributing major evidence to evolutionary theory. Cytological, serological, biochemical, and other techniques are adding to the precision of taxonomic interpretation. At the synthetical level, phylogenetic research is approaching closer to its goal of a true picture of the course of evolution with the mass of new evidence from paleontology, experimental embryology, comparative biochemistry, comparative biochemistry, comparative ecology and, of course, zoogeography.

Biochemists have quickly learned on their own the basic ancient laws of systematics. Although the biochemical character

is only a part of the supporting data for discrimination, every taxonomic character is potentially important.

As a result, taxonomy stands at mid-20th century as one of the most challenging fields of biology. In the proceedings of an International Conference on Systematic Biology conducted at the University of Michigan, organized by no less than systematists of note, included in the summary of the Conference, in the words of Kaplan (1965) is this: "... that the use of new biochemical procedures will not supercede the classical phylogenetic and taxonomic studies but will add quantitative parameters for use together with the classical approach. Specific problems that the classical methods cannot resolve may be solved by the comparative enzyme technique... Perhaps, in years to come, investigators utilizing both classical and molecular approaches will be able to clarify the intricate mechanisms involved in evolutionary changes and in the origin of new species". Numerical taxonomy remains as another activity in the future.

Substantial progress has been made in the organization and support of taxonomy during the past decade. There is a Society for Systematic Zoology based in the United States. The National Institutes of Health (NIH) has supported my efforts for 13 years, eight of which were with the cooperation of the Smithsonian Institution. In this country, financial support has also been extended to me over the years by the Office of Research Coordination, University of the Philippines, the National Research Council of the Philippines (NRCP), the Philippine Council for Agricultural Resources Research and Development (PCARRD). The Association of Systematic Biologists of the Philippines may be considered a beacon to the progress of systematics in this country. The facilities of the Natural Science Research Center (NSRC) have been for the past few years available without charges. The new policy of the Natural Science Research Center to charge P300.00 per room occupied, not to mention the rentals of refrigerators, air conditioners, microscopes, etc. with equitable charges, may limit the activities of some researchers.

"In biology, as it is in the physical sciences, and as it ought to be when administrators deal with serious biological problems which confront us, the first essential is to know what you are *talking about*". That is one of the very reasons for the importance of *taxonomy* and *systematics*.

THE ASSOCIATION OF SYSTEMATIC BIOLOGISTS OF THE PHILIPPINES (ASBP)

Rationale

Systematics is one of the oldest and most important branches of biology today. It is the most interdisciplinary of all the biological sciences. It includes cataloguing of all life forms, an analysis of evolutionary diversification at all levels of biological organization and the mechanisms responsible for the diversity.

Of the estimated 12,000 plus species of plants and about 60,000 species of animals in the country, many have not yet been described and classified. Some of these are of immediate importance to mankind. Some of the results of systematic-taxonomic research are now evident in the new food, fuel and medicine of fungal, bacterial, plant and animal origin, and in materials useful in pest management, disease control, landscaping and construction.

Given the significance of systematic biology, its financial support base is surprisingly nil. Many important systematic efforts, both individual and cooperative, are not even supported at present. The problem is serious considering the diversity of expertise required to perform such a basic task as the accurate inventory of the flora and fauna of even a modest tract of land.

There are only few undergraduate and even fewer graduate students majoring in systematic biology today. Probably, this is due to the fact that students do not find a bright future in the profession — a view which should be changed through proper orientation and encouragement by the practicing systematists of the country today.

Systematic biology has evolved several times in several sub-disciplines. Today, despite its past achievements and its promise for the future, it remains a highly fragmented field. In the Philippines there are about 200 individuals committed to organism-oriented research in more than 20 public and private institutions.

The Association

The ASBP is a national, non-profit, scientific organization established in January, 1983 to promote and stimulate research, education and training in systematic biology in the Philippines, to foster closer ties among systematic biologists, to disseminate information on priorities, needs and trends in systematics, to provide representation of the systematics community in govern-

ment and private sectors of the Philippine society, and to locate public and private sources of support for systematics research.

The ASBP was formed by a group of 15 charter members coming from various institutions in the country after several organizational meetings held at the National Museum and at the University of the Philippines at Los Banos, Laguna and at Diliman, Quezon City.

Members are classified into five categories: honorary, regular, associate, hobbyist, and institutional. A Membership Committee determines the membership category of each applicant based on his qualifications. Honorary members are selected on the basis of their outstanding contributions to Philippine systematic biology. Honorary membership is by invitation only. Regular members are active Filipino systematists who have at least one (1) published taxonomic paper within the past five (5) years, or with one taxonomic-systematic research in progress. Associate members are systematists with no publication in the past five years, professionals in the supportive fields of systematic biology, and students interested in systematic biology. Hobbyists are field collectors, illustrators, or preparators of biological specimens. Institutions supportive of the goals of ASBP may be invited or many apply as institutional members.

Annual membership dues are as follows:

Regular	P100.00
Associate	50.00
Hobbyist	30.00
Institutional	500.00

Activities of ASBP

- A regular Newsletter to be circulated to all members and interested individuals and institutions. The Newsletter will cover feature articles, announcements, research reports, etc. It may be sold to non-members at a minimal cost to be fixed by Board of the Association.
- An Annual Convention and Meeting of members shall be held on the last Saturday of May.
- Seminars, symposia, workshops and exhibits relating to systematic biology may be held occasionally at various places.
- Support of individual or term research projects in systematic biology, or indorsement of said projects to funding agencies.

- Field training in botanical-zoological collection, curation and management of biological specimens for teachers, researchers and students, and other training courses in systematic biology.
- Recognition of outstanding Filipino systematic biologists.
- Publication of technical papers in systematic biology.

The Systematic Biologists of the Philippines Foundation, Inc.

In order to raise and manage funds to support systematic biology in the country, the *Systematic Biologists of the Philippines Foundation, Incorporated* was organized and is now being registered with the Securities and Exchange Commission. This is a non-stock, non-profit organization composed of the 15 original incorporators of ASBP. The Foundation hopes to attract the attention and sympathy of local and foreign supporters of systematic biology in order for ASBP to meet its objectives.

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CONSTITUTION OF THE ASSOCIATION OF SYSTEMATIC BIOLOGISTS OF THE PHILIPPINES

PREAMBLE: We, the systematic biologists of the Philippines, recognizing the need to consolidate our efforts to achieve our professional goals and aspirations through the adoption of effective strategies for the advancement of systematics and the dissemination of its relevance to the public, do hereby bind ourselves into an ASSOCIATION OF SYSTEMATIC BIOLOGISTS OF THE PHILIPPINES, and ordain and promulgate this Constitution.

ARTICLE I — NAME AND OBJECTIVES

Section 1. The association shall be known as the ASSOCIATION OF SYSTEMATIC BIOLOGISTS OF THE PHILIPPINES. The official acronym shall be ASBP.

Section 2. The objectives of the Association are:

- A. To promote and stimulate research, education and training in systematic biology in the country.
- B. To foster closer ties among systematic biologists and to disseminate information on priorities, needs and trends in the systematics community.
- C. To provide representation of the systematics community in government and private sectors of the Philippine society, and to locate public and private sources of support for systematics research.

Section 3. The Association shall be non-stock, non-profit.

ARTICLE II — MEMBERSHIP

Section 1. Membership shall be through invitation or application.

Section 2. Members shall be classified into five categories: honorary, regular, associate, hobbyist, and institutional.

Section 3. The status of all members, except the honorary and the institutional, shall be reviewed and reclassified every three years from the date of membership.

Section 4. A Membership Committee shall determine the membership category of each applicant based on his/her qualifications. The Committee shall recommend the membership category for each applicant to the Governing Board for final approval.

Section 5. Applicants shall be informed of their membership category not later than a month before the start of the Annual National Convention of the Association.

Section 6. Applications for membership shall be submitted not later than three (3) months before the Annual National Convention.

Section 7. Membership Categories

A. Honorary Members

1. Honorary membership shall be by invitation, upon the recommendation of the Membership Committee.
2. Honorary members shall be selected on the basis of their outstanding contributions to the advancement of Philippine systematics.
3. Honorary members shall enjoy all the rights and privileges provided for in the constitution except the right to vote and to hold offices and committee memberships.

B. Regular Members

1. Regular members shall be active Filipino taxonomists-systematists who have at least one (1) published taxonomic paper within the past five (5) years or with one taxonomic research in progress.
2. Regular members without publications every five (5) years beginning on the date of their admission to the Association shall be considered "inactive regular members" by the Governing Board upon recommendation of the Membership Committee. Restoration to "active" status shall be upon recommendation of the Membership Committee.

3. Only active regular members shall enjoy all the rights and privileges provided for in the constitution.

C. Associate Members

1. Associate members shall be students and professionals in the supportive fields of systematic biology.
2. Associate members shall enjoy all the rights and privileges provided for in the constitution except the right to vote and hold elective positions.

D. Hobbyists

1. Field collectors, illustrators, or preparators of biological specimens may qualify under the category.
2. Members of this category shall enjoy all the rights

and privileges provided for in the constitution except the right to vote and hold elective positions.

E. Institutional Members

1. Any public or private institution supportive of the goals of the Association may be invited or may apply for institutional membership.
2. Institutional members shall be entitled to representation in the activities of the Association.

ARTICLE III — GOVERNING BOARD AND OFFICERS

Section 1. The Governing Board shall be composed of the officers duly elected biennially by the active regular members.

Section 2. The officers of the Association shall be a President, Vice-President, Treasurer, Secretary, Assistant Secretary, Business Manager, and Press Relations Officer.

Section 3. The immediate past President of the Association shall be Ex-officio member of the Governing Board without voting power.

ARTICLE IV — FUNDS AND DUES

Section 1. Funds of the Association shall be controlled and administered by the Governing Board.

Section 2. Dues shall be set up by the Governing Board, subject to the approval of the Association at the Annual Meeting.

Section 3. All members, except honorary, who fail to pay the dues for two (2) consecutive years automatically forfeit their membership. Restoration to membership shall be upon payment of back dues.

ARTICLE V — PUBLICATIONS

Section 1. The Association shall maintain at least one (1) official publication which shall be circulated to all members.

Section 2. Subscription rates shall be as prescribed by the Board.

ARTICLE VI — COMMITTEES

Section 1. Standing committees shall be created by the Governing Board.

- 1.1 The Membership Committee shall consist of the Vice-President as chairman and two (2) active regular members who are not officers.

1.2 Other standing committees shall be constituted as needed.

Section 2. Officers and standing committee members shall have the same tenure of office.

Section 3. Ad hoc committees shall be constituted as needed.

ARTICLE VII -- MEETINGS

Section 1. The Governing Board shall meet on the first month of every quarter on a date set by the Board.

Section 2. A majority shall constitute a quorum.

Section 3. Special meetings may be called when necessary.

ARTICLE VIII -- ANNUAL CONVENTION

Section 1. The Annual Convention shall be held on the last Saturday of May.

Section 2. A majority of the regular members shall constitute a quorum.

ARTICLE IX -- RATIFICATION AND AMENDMENTS

Section 1. This Constitution shall take effect upon ratification by all members present.

Section 2. Proposed amendments shall be presented to the Board for consideration two (2) months before the Annual Convention and shall be ratified by at least two-thirds of the regular members present in the Annual Convention.

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BY-LAWS OF THE ASSOCIATION OF SYSTEMATIC BIOLOGISTS OF THE PHILIPPINES

ARTICLE I -- NAME AND ADDRESS

Section 1. The name of the Association shall be ASSOCIATION OF SYSTEMATIC BIOLOGISTS OF THE PHILIPPINES.

Section 2. The official address of the Association shall be *The National Museum, Executive House Bldg., P. Burgos St., Manila, Philippines.*

ARTICLE II -- FEES AND ANNUAL DUES

Section 1. The annual membership dues shall be:

A. Regular member	P100.00
B. Associate member	50.00
C. Hobbyist	30.00
D. Institutional	500.00

Section 2. The annual dues shall apply from May 1 to April 30 of the following (fiscal) year.

ARTICLE III -- CONTROL OF FUNDS

Section 1. Funds of the Association shall be deposited in a bank.

Section 2. Funds withdrawn by the Treasurer and Business Manager shall bear the written approval of the President.

Section 3. An annual, duly audited, financial report shall be presented at the Annual Convention.

ARTICLE IV -- ELECTIONS

Section 1. Proxy voting shall not be allowed.

Section 2. Only regular members in good standing may vote and hold elective position.

Section 3. Officers shall be determined by plurality of votes during the Annual Meeting.

ARTICLE V -- PUBLICATIONS

Section 1. The Association shall issue a regular newsletter and/or other publications.

Section 2. Technical publications shall be under an Editorial Board which shall be constituted by the Governing Board.

Section 3. Members of the Editorial Board shall receive honorarium to be fixed by the Governing Board.

ARTICLE VI — DUTIES OF OFFICERS

Section 1. The President shall preside over all meetings of the Association and the Board, and shall supervise all the activities of the Association. He shall perform such other duties as are ordinarily inherent in the Office of the President.

Section 2. The Vice-President shall assist the President in the performance of his duties, and shall perform the powers and duties of the President in his absence or incapacitation. He shall serve as Chairman of the Membership Committee.

Section 3. The Treasurer shall be the custodian of the funds and property of the Association. He shall keep record of all receipts and expenditures of the Association, prepare financial statements, and perform such other duties as the President or the Board may assign him.

Section 4. The Secretary shall keep a record of the minutes of all the meetings of the Association and of the Board. He shall give notice of all meetings of the Association and of the Board. He shall perform such duties as are customarily inherent in the Office of the Secretary.

Section 5. The Assistant Secretary shall assist in the performance of the duties of the Secretary.

Section 6. The Business Manager shall serve as the manager of the Association. He shall implement the decisions, policies, and instructions of the Board or of the President.

Section 7. The Press Relations Officer shall be responsible for disseminating information to the public on matters concerning the activities of the Association, and perform other duties inherent in the Office of Press Relations Officer. He shall be responsible also for the publication of the Association's Newsletter.

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THE ROLE OF THE NATIONAL SCIENCE AND TECHNOLOGY AUTHORITY IN THE DEVELOPMENT OF SYSTEMATIC BIOLOGY IN THE PHILIPPINES*

Quintin L. Kintanar **

Officers and Members of the Association of Systematic Biologists of the Philippines, Distinguished Guests, Ladies and Gentlemen, Good morning,

First of all, I would like to publicly thank the organizers for inviting me to your general meeting. I consider it a great honor to have been chosen as guest speaker on this occasion, and as inducting officer of the first set of officers and members of the Association.

Systematic Biology is not new of course in the Philippines. As early as the Spanish Era, work began on the identification, classification, and inventory of our rich flora and fauna. The tempo of taxonomic work went into higher gear during the American Regime in the Bureau of Science and in various academic institutions, both government and private, and work has continued to this very day. The quality and importance of these pioneering studies is shown by the fact that the workers have been recognized both here and abroad. Systematic biologists are well represented in the ranks of academicians and national scientists of the National Academy of Science and Technology (NAST).

I believe the symposium later this morning will review and assess the past and the present, and suggest directions and plans for the future in both Systematic Botany and Systematic Zoology in our country. I shall not be so presumptuous as to tell you what and how to do your systematics work. You are the experts and I am but a scientific "kibitzer". But perhaps from my perspective, I can give some ideas on where we would like to go.

In general, the NSTA sees science and technology as crucial inputs to our national development. We believe that science and technology is not only a prerequisite but is the very essence of modernization. Therefore, we need to build up our capability in science and technology. This was the rationale for the reorganization of S & T system of the country through Executive Order 784, so that we accelerate the build up of this S & T capability, hasten the process of modernization, and enhance socio-economic development, ultimately to redound to the improvement of the quality of life of our people.

*Speech delivered during the ASBP General Meeting, Induction of Officers and Members, and Symposium at the National Museum, September 17, 1983.

**Deputy Director-General, NSTA.

As you may know, with the issuance of E.O. 784, a National Science and Technology Authority (NSTA) has been created which has four organic S & T Councils, Philippine Council for Agriculture and Resources Research and Development (PCARRD), Philippine Council for Health Research and Development (PCHRD), Philippine Council for Industry and Energy Research and Development (PCIERD), and National Research Council of the Philippines (NRCP). The first three councils are for applied research and development in their respective sectors, while NRCP is the Council for basic research and basic sciences including the social sciences and the humanities where they interface with sciences and technology. These councils are responsible for planning and formulating policies, and for supporting, monitoring and evaluating scientific and technological activities for their respective sectors.

Systematic Biology being a basic science would fall under the NRCP, but this does not mean that no systematic biological work may be supported by the other councils if this forms part of a priority program or project in their sector. For instance, I can see that PCARRD in its Agricultural R & D program may need the services of plant and animal taxonomists, while PCHRD may need the help of systematics specialists in their study of parasites and microorganisms. Even Industry and Energy may require the service of systematics specialists as was demonstrated when they were confronted with microbiological contamination of the cocodiesel fuel.

Beyond the S & T Councils, there have been new initiatives by way of the establishment of educational and research institutions. Particularly relevant to your concern is the recent establishment of 6 centers of Excellence in the Basic Sciences, two of which, the Institute of Biological Sciences at UPLB, and the Natural Sciences Research Institute in U.P. Diliman, would have great interest in systematic biology. The strengthening of the systematic biology program of these Institutes would require the services and contributions of the experts and specialists, many of whom are members of your Association.

I see the organization of the ASBP as most timely. Although in the past decades development in the discipline of taxonomy has been overshadowed by tremendous developments in experimental biology, molecular biology, and genetic engineering. It has been realized of late that in order to study any living organism, one must start with its identity, classification and characterization.

With the advances in instrumentation and biochemical methods, new tools and approaches to systematic biology have become available and await the imaginative scientists who can now probe deeper and use new information in their systematics work.

The systematics work, including inventory and collection, becomes even more urgent now because of the rapid rate at which ecosystems especially in the tropics are being affected by man's developmental activities, usually leading to impoverishment and extinction of some species.

We need to improve our national reference collection of plants and animals, and we need to define the roles of the various institutions both government and private in this effort. This must include a fuller knowledge and better understanding and management of our aquatic and marine biological resources. Also important are our culture collections of microorganisms. The institutions to do these various essential tasks in systematic biology must be identified, so that they can be supported. Human resource development through graduate programs and research needs to be enhanced, including special programs that would allow study-visits or training for both experienced and young workers in research institutions both here and abroad.

I therefore congratulate you for your initiative in organizing yourselves into the Association of Systematic Biologists of the Philippines and wish you success in your undertakings in this most significant field of science.

Thank you and good day.

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ASBP NEWS

1983 ASBP Honorary Membership for Cendana, Nemenzo, Quisumbing, Velasquez. — The Association of Systematic Biologists of the Philippines, during its First Annual Meeting on 17 September 1983 at the Philippine National Museum, conferred Honorary Membership to four Filipino pioneers in Philippine Systematic Biology: Dr. Silverio M. Cendana, for his works on applied and basic Entomology; Dr. Francisco Nemenzo, Sr., for his researches on Philippine corals; Dr. Eduardo A. Quisumbing, for his studies on Philippine vascular plants with emphasis on orchids, as well as for his leadership in the post-war rehabilitation of the Philippine National Herbarium; and Dr. Gregorio T. Velasquez, for his contributions to Philippine Phycology, especially in the taxonomy of blue-green algae. The nomination to honorary membership was made by the Membership Committee and approved by the Board of Directors.

I. J. Dogma, Jr., R. Dela Paz, G. Trono, Jr.

Soil Fungi in a Mangrove Forest at Pagbilao, Quezon Province — Isolations by F.R. Uyenco and M.P. Follosco yielded 1,175 isolates in 41 genera, 10 families, and four classes. Majority of the isolates belonged to Form-class Deuteromycetes (Fungi Imperfecti). Oomycetous, zygomycetous and ascomycetous isolates occurred in low frequencies. Basidiomycetes were not encountered.

F.R. Uyenco

Petroleum-utilizing Bacteria from La Union Coast — Three hundred and fourteen isolates of bacteria utilizing petroleum were obtained from waters along the coast of La Union province. These belonged to 10 genera and 10 families. The *Pseudomonas* group constituted 39% of the isolates. Other isolates were members of Micrococaceae, Enterobacteriaceae, Bacillaceae, Cytophagaceae, Actinomycetaceae, Neisseriaceae, Nocardaceae, Vibrionaceae and the *Arthrobacter* group.

F.R. Uyenco

ASBP Asst. Sec. Attends Seed Course in New York — William Sm. Gruezo, Asst. Sec. of ASBP, attended the 3-week course *Seed Physiology & Seed Handling in Genebanks* at Cornell Univer-

sity's New York State Agricultural Experiment Station (NYSAES) in Geneva, New York, U.S.A. The course was held from 8th to 26th August 1983 and was sponsored by the International Board for Plant Genetic Resources (FAO-UN, Rome, Italy) and the Department of Vegetable and Seed Sciences, NYSAES, Cornell University.

Prof. Gruezo is on the faculty of the Systematics Laboratory, and Head, Publication & Extension Office, Institute of Biological Sciences (IBS), UPLB; Curator, Mycological Herbarium, UPLB Museum of Natural History; Study Leader, National Plant Genetic Resources Laboratory, Institute of Plant Breeding, UPLB; and Circulation Manager, *Kalikasan, The Philippine Journal of Biology*.

I. J. Dogma, Jr.

National Research Council of the Philippines Donates P3,000 to ASBP — The Association received a P3,000 — donation from the NRCP. The money was used to finance the publication of the newsletter and printing of hand-out materials given to members during the First General Meeting, Induction of Officers and Members, and Symposium of ASBP last 17 September 1983.

D.A. Madulid

Butterfly Color and Behavior Patterns, with Emphasis on Allopatric Batesian and Muellierian Mimicry — This was the topic discussed by Dr. Benjamin H. Landing, M.D., A.B., Entomology, Harvard, and Pathologist-in-Chief and Professor of Pathology & Pediatrics, School of Medicine, University of Southern California, Los Angeles, during a lecture last 8 November 1983 at the Master's Hall of the Philippine National Museum. The lecture was co-sponsored by ASBP, the National Museum, and the National Research Council of the Philippines.

D.A. Madulid

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PUBLICATIONS AVAILABLE

From Kalikasan, The Philippine Journal of Biology, P.O. Box 361, University of the Philippines at Los Banos, College, Laguna 3720.

Vascular Flora of Mount Makiling and Vicinity (Luzon: Philippines), Part 1. Pancho, J.V. Kalikasan, The Philippine Journal of Biology, Supplement No. 1. 31 March 1983. 476 p. ISSN 0115-0553. Hardbound (60-lb bookpaper) — Philippines, P300.00; Foreign, US\$30.00. Softbound (newsprint) (Available only for use in the Philippines) — P100.00. Price includes handling and mailing (surface) cost.

The Supplement covers the first of a four-part series which is the culmination of the author's work for over 15 years to document the diverse flora of Mount Makiling, a well-known and typical Philippine rainforest mountain in Luzon. Part 1 includes a general introduction to the geology, climate, soil, flora, fauna, and political and scientific history of Mount Makiling and environs; keys to identification; descriptions of families, genera, species and varieties; over 100 plates of original line drawings of representative species and varieties; world and Philippine distributions; up-to-date nomenclature, common names used in the Philippines, and citations of herbarium materials for each species; and indexes to scientific names and common names.

Vascular Flora... is destined to be a new landmark in Philippine botany. And it is long-overdue, for there has been no other major work of its kind in the country since E.D. Merrill's prewar classics — *A Flora of Manila* (1912) and *An Enumeration of Philippine Flowering Plants* (4 vols., 1923-26).

Philippine Aquatic Weeds. J.V. Pancho. KPJBAR 5(1): 36-91 (1976). Special reprint, with added table of contents and index. Paperback. Limited copies. Postpaid surface mail. Philippines, P20.00; foreign, US\$3.00.

Abstract. Thirty-nine species of vascular and non-vascular aquatic weeds are recorded for the Philippines. Keys to families, genera and species, descriptions, illustrations, local names, distribution, and information on ecology are presented.

Plants Poisonous to Livestock in the Philippines. J.V. Pancho. KPJBAR 12(3): 193-284 (1983). Special reprint. Paperback.

Limited copies. Postpaid surface mail. Philippines, P100.00; foreign US\$8.00.

Abstract. A treatise on two species of mushrooms and fifty-eight of vascular plants poisonous to livestock in the Philippines is presented. For each species are given the following: scientific name, common name(s), description, illustration, habitat, distribution, poisonous principle, toxic plant part, animals affected, and toxicity symptoms.

From the Philippine National Museum, Executive House Bldg., P. Burgos St., Manila

Zoological papers

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|---|--------|
| No. 5. Survey of Class Ophiuroidea in Tayabas Bay. | |
| Alejandro K. de Celis | P15.00 |
| No. 6. Inventory of the Littoral Fauna of Tayabas Bay | |
| (Crustacea: Stomatopoda). Renato Garcia | 15.00 |
| No. 7. Survey of Class Demospongiae in Tayabas Bay. | |
| Rodolfo A. Caberoy | 20.00 |
| No. 8. Shallow Water Scleractinians. Rogelio Rivera ... | 15.00 |
| No. 9. Polychaetous Annelids. Virgilio Palpal-Latoc ... | 20.00 |
| No. 10. Simplified Taxidermy. Rogelio Sison | 15.00 |
| No. 11. Polychaete Worms. V. Palpal-Latoc & | |
| P. Gonzales | 9.00 |
| No. 12. A Primer on Sponges. R. Caberoy & H. Tabil .. | 15.00 |
| No. 13. Echinoderm Fauna. Alejandro de Celis | 25.00 |

Botanical papers

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|---|-------|
| No. 2. A Collection of Mosses from Lubang Islands, | |
| Mindoro, Philippines. Romualdo del Rosario | |
| & Gerard L. Penecilla | 15.00 |
| No. 3. Moss Endemism in the Philippines. R.M. del Rosario | |
| & G. Penecilla | 15.00 |
| — Moss Flora of the National Botanic Garden. | |
| R.M. del Rosario | 25.00 |
| — Study of Philippine Marine Red Algae. | |
| Paciente Cordero, Jr. | 30.00 |

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**ASSOCIATION OF SYSTEMATIC BIOLOGISTS OF THE PHILIPPINES,
MEMBERSHIP ROLL, AS OF SEPTEMBER 17, 1983**

Honorary

- CENDAÑA, SILVERIO, Department of Entomology, University of the Philippines at Los Baños, College, Laguna
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FORTHCOMING MEETINGS, SYMPOSIA, CONGRESSES, WORKSHOPS, TRAININGS, SEMINARS, CONFERENCES

Third International Congress of Systematic and Evolutionary Biology. University of Sussex, Brighton, U.K., July 4-10, 1985. For information contact: ICSEB III Congress Office, 130 Queen's Road, Brighton, Sussex, U.K.

XVI Pacific Science Congress. Seoul, Korea, August 20-30, 1987. For information contact: Organizing Committee, XVI Pacific Science Congress, K.P.O. Box 1008, Seoul 110, Korea. Tel. (02) 733-4478.

Association of Pacific Systematists. General meeting to coincide with the XVI Pacific Science Congress. Seoul, Korea, August 20-30, 1987. For information contact: Dr. S. H. Sohmer, Bishop Museum, P.O. Box 190000-A, Honolulu, Hawaii.

Second International Legume Conference. Biology of the Leguminosae, Missouri Botanical Garden, St. Louis, Missouri, U.S.A., June 23-27, 1986. For information contact: Dr. J.L. Zarucchi, Legume Conference Coordinator, Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166.

International Symposium on South East Asian Plant Genetic Resources. Widya Graha Building, Lembaga Ilmu Penetahuan, Indonesia (LIPI), Jl. Gatot Subroto 10, Jakarta, August 20-24, 1985. For information contact: Secretary, Symposium on South East Asian Plant Genetic Resources, c/c Lembaga Biologi Nasional, Jalan Raya Juanda 18, Bogor, Indonesia.

CALL FOR PAPERS

Members of ASBP are requested to send in their contributed papers such as feature articles, personal news, herbarium and museum news, travel or fellowship grants, research grants, field trips, meetings, symposia, training courses, etc. (all pertaining to systematic biology) for possible inclusion in the forthcoming issues of ASBP COMMUNICATION. Non-members may also send in their contributions.

Address contributions in duplicate to:

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